

In addition, we examined specimens collected during the period of the study by other prairie invertebrate researchers, Wisconsin DNR wildlife managers, and conservation biologists at the Wisconsin DNR Bureau of Endangered Resources. Specimens were identified using keys in Otte (1981, 1984) and Vickery and Kevan (1985), with help from Scudder (1897), Brooks' (1958) drawings of the *Melanoplus* spp. genitalia, and Hubbell's (1960) and Song's (2004) treatments of *Schistocerca* spp.

We have identified 70 species of Acrididae from Wisconsin, none of which are endemic to the state. We also believe one additional species (not included in the list below) is adventive. *Romalea microptera* (not a true short horned grasshopper, Orthoptera: Romaleidae) was collected June 23, 1973, on the bluffs above the Mississippi River in the south-western corner of the state and one was also collected in a garden in Madison on July 20, 1965. The first specimen was likely a migrant from Mississippi River barge traffic; the second specimen is less understood, but perhaps represents an escaped specimen from a biology class.

Ten other species were collected at only one site and may now be extirpated from the state. These are *Pardalophora phoenicoptera*, *Hippiscus ocelote*, *Metaleptea brevicornis*, *Schistocerca alutacea*, *S. americana*, *S. damnifica*, *Paratylotropidia brunneri*, *Encoptolophus costalis*, *Hesperotettix speciosus*, and *Melanoplus rusticus obovatipennis*. Only one species on this list, *H. speciosus*, has been collected recently in Wisconsin; the others have not been collected in at least 25 years. Further survey work needs to be done to clarify the status of these species in Wisconsin.

It is possible that another sixteen species may be found in the state, based on collections in neighboring states in habitat similar to that found in Wisconsin. Nine of these species (*Melanoplus packardii*, *M. occidentalis*, *Hypochlora alba*, *Campylacantha olivacea*, *Amphitornus coloradus*, *Mermiria picta*, *Boopedon auriventris*, *Metator pardalinus*, and *Xanthippus corallipes*) are known from the grasslands to the West. Two species are preferential to wetlands or wet grassland, and include *Stethophyma celata* from Minnesota and Illinois and *Paroxya hoosieri* from Michigan and Indiana. Five species are associated with northern woodlands of Michigan and Minnesota and include *Melanoplus eurycerus*, *M. gracilis*, *M. huroni*, *Appalachia arcana* (endemic to Michigan), and *Booneacris variegata*. To confirm these species in Wisconsin, formal surveys will need to be conducted in appropriate habitats. The woodland and wetland habitats, for example, have not been surveyed in any manner for grasshoppers. To account for their potential presence in Wisconsin, we incorporated most of these species into the taxonomic keys included in this guide.



GIFF BEATON

# GRASSHOPPER IDENTIFICATION KEYS



GIFF BEATON

ERIC EPSTEIN

# Grasshopper Anatomy

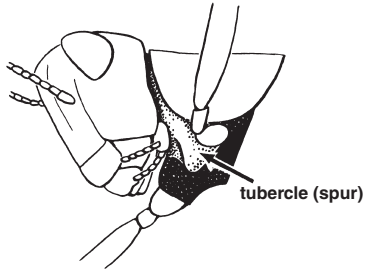


Figure 6. Prosternal tubercle of spurthroat grasshopper (adapted from Capinera and Sechrist 1982).

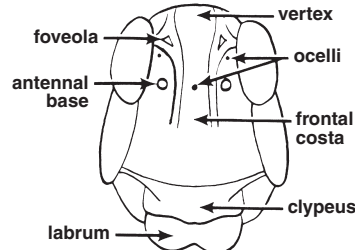


Figure 7. Frontal view of adult grasshopper head (adapted from Capinera and Sechrist 1982).

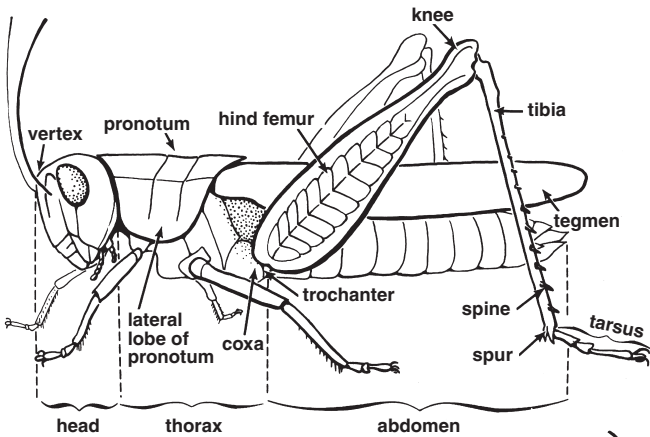


Figure 8. Lateral view of adult grasshopper (adapted from Capinera and Sechrist 1982).

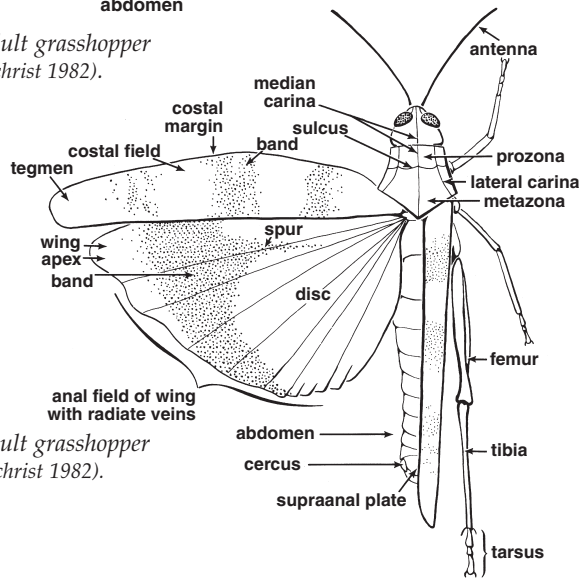


Figure 9. Dorsal view of adult grasshopper (adapted from Capinera and Sechrist 1982).

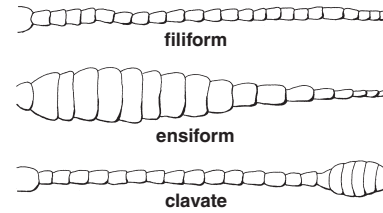


Figure 10. Grasshopper antennae (adapted from Pfadt 1994).

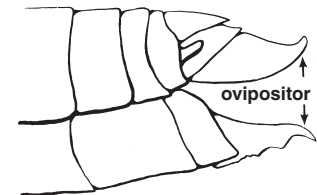


Figure 11. Female reproductive anatomy (adapted from Capinera and Sechrist 1982).

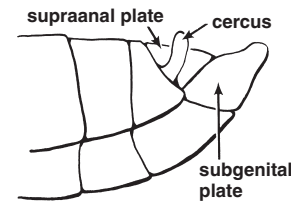


Figure 12. Male reproductive anatomy, lateral view (adapted from Capinera and Sechrist 1982).

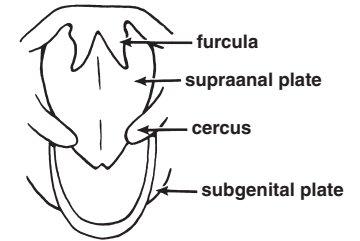


Figure 13. Male reproductive anatomy, dorsal view (adapted from Capinera and Sechrist 1982).

## Identification Keys



In this section of the guide, we present keys for the identification of Wisconsin grasshoppers. These keys apply only to adult grasshoppers. For help in species identification of immature acridids refer to Pfadt (1994). We have included a few species in the keys that have not yet been found in Wisconsin, but may occur here. The names of these species are presented in parentheses. Body length is measured from the front of the head to the end of the abdomen.

## Key to the Subfamilies

- 1a. With a distinct knob at the base of the neck (prosternal tubercle) (see Figure 6) . . . **Cyrtacanthacridinae and Melanoplinae, KEY B**
- 1b. Lacking a prosternal tubercle . . . . . **2**
- 2a. Vertex angular, face strongly slanted to vertical, hind wings transparent, antennae filiform, ensiform, or clavate (see Figure 10) . . . . . **Acridinae and Gomphocerinae, KEY A**
- 2b. Vertex rounded, face usually vertical, hind wings often banded and strongly colored, antennae typically filiform or clavate (see Figure 10) . . . . . **Oedipodinae, KEY C**

## KEY A. The Slantfaced Grasshoppers (Acridinae and Gomphocerinae)



GIFF BEATON

1a.	FOVEOLAE AREA VISIBLE FROM ABOVE . . . . .	2
1b.	FOVEOLAE AREA NOT VISIBLE FROM ABOVE . . . . .	8
2a.	Clavate antennae (less obvious on females) (see Figure 10), white vertical stripe in front of eye . . . . .	<b><i>Aeropedellus clavatus</i></b>
2b.	Filiform antennae (see Figure 10) . . . . .	3
3a.	HIND FEMORA DISTINCTLY MARKED . . . . .	4
3b.	HIND FEMORA UNMARKED, wet habitats . . . . .	5
4a.	Tegmina extending nearly to end of abdomen, femora with dark triangles on dorsal surface, pale antennae, hind tibial spurs unequal in length . . . . .	<b><i>Ageneotettix deorum</i></b>
4b.	Tegmina short, hind tibial spurs equal in length . . . . .	<b><i>(Boopedon auriventris)</i></b>
5a.	Prozona longer than metazona, vertex carina indistinct, narrowly rectangular foveolae, body length less than 20mm . . . . .	<b><i>Chorthippus curtippennis</i></b>
5b.	Prozona not longer than metazona, vertex carina distinct, foveolae triangular, body length at least 23mm . . . . .	6
6a.	Prozona distinctly shorter than metazona, pronotal lateral carinae divergent posteriorly and cut by more than one sulcus, hind tibial spines black . . . . .	7
6b.	Prozona subequal to metazona, carinae only vaguely divergent and cut by one sulcus, hind tibial spines yellow with black tips, upper third of lateral lobes of pronotum dark . . . . .	<b><i>(Stethophyma celata)</i></b>
7a.	Tegmina with a white streak along the side, lateral carinae cut by three sulci . . . . .	<b><i>Stethophyma lineata</i></b>
7b.	Tegmina lacking white streak, lateral carinae cut by two sulci . . . . .	<b><i>Stethophyma gracile</i></b>
8a.	Three dorsal carinae on head and pronotum (pronotal ridges may be obscure on some males), adults present in May . . . . .	<b><i>Eritettix simplex</i></b>
8b.	Only one dorsal carina on head and pronotum . . . . .	9
9a.	ANTENNAE ENSIFORM (see Figure 10) . . . . .	10
9b.	ANTENNAE FILIFORM (see Figure 10) . . . . .	14
10a.	Tips of tegmina cut obliquely (see photograph, page 43), extending well beyond hind femora, rare wetland species . . . . .	<b><i>Metaleptea brevicornis</i></b>
10b.	Tips not cut obliquely, tegmina short or long . . . . .	11

11a.	VERTEX CARINA DISTINCT, lateral pronotal carinae cut by one sulcus, postocular bands indistinct or lacking . . . . .	12
11b.	VERTEX CARINA INDISTINCT, lateral pronotal carinae cut by at least two sulci, distinct postocular bands . . . . .	13
12a.	Abdomen extending beyond hind femora, tegmina shorter than both, tall grasses in prairie habitat . . . . .	<b><i>Pseudopomala brachyptera</i></b>
12b.	Hind femora longer than abdomen, possibly host specific on blue grama grass ( <i>Bouteloua gracilis</i> ), western prairie species . . . . .	<b><i>Opeia obscura</i></b>
13a.	Lateral carinae cut by three sulci, female tegmina with a light streak, apex of male subgenital plate a blunt cone, vertex broadly rounded, tall grasses of prairie habitat . . . . .	<b><i>Mermiria bivittata</i></b>
13b.	Lateral carinae cut by two sulci, tegmina lacking a light streak, male subgenital plate strongly tapering, vertex long and narrowly rounded, dry prairie and sandy habitats . . . . .	<b><i>(Mermiria picta)</i></b>
14a.	VERTEX LACKING A MEDIAN CARINA, males with enlarged fore and middle femora . . . . .	15
14b.	VERTEX WITH DISTINCT MEDIAN CARINA, males without enlarged femora . . . . .	17
15a.	Lateral pronotal carinae parallel, tegmina usually extending only to mid-abdomen, body typically very green . . . . .	<b><i>Dichromorpha viridis</i></b>
15b.	Lateral carinae constricted, tegmina extending beyond abdomen . . . . .	16
16a.	Lateral pronotal carinae cut by one sulcus, impression on vertex narrow and near margin, tegmina usually shorter than hind femora . . . . .	<b><i>Orphulella speciosa</i></b>
16b.	Lateral carinae cut by two or more sulci, impression on vertex forming a quarter moon distinctly behind margin, tegmina equal to or longer than hind femora . . . . .	<b><i>Orphulella pelidna</i></b>
17a.	Large species, male body length 22-27 mm, females 35-40 mm, tegmina with a line of large spots . . . . .	<b><i>Syrbula admirabilis</i></b>
17b.	Small species, males shorter than 20 mm, females shorter than 28 mm, tegmina lacking a line of spots . . . . .	18
18a.	HIND TIBIA RED OR ORANGE, tegmina not longer than abdomen . . . . .	19
18b.	HIND TIBIA BLUE, tegmina longer than abdomen . . . . .	<b><i>(Amphitornus coloradus)</i></b>
19a.	Male lateral pronotum entirely black, female tegmina with rounded tips typically covering about half of abdomen, hind femur with a central white spot, female inner hind femur black basally, macropterous females found occasionally . . . . .	<b><i>Chloealtis conspersa</i></b>
19b.	Male lateral pronotum black along upper edge only, female tegmina extending only to about one-third length of abdomen with pointed tips, posterior pronotal margin rounded, female hind femora not as above . . . . .	<b><i>Chloealtis abdominalis</i></b>

## KEY B. The Spurthroated Grasshoppers (Cyrtacanthacridinae and Melanoplinae)



VALERIE WRIGHT

For species identification, lab or field examination of *Melanoplus* spp. males are preferred over females, given the greater dissimilarity of external genital structures between males of different species.

- 1a. WINGS ABSENT . . . . . 2
- 1b. WINGS PRESENT . . . . . 3
  
- 2a. Anterior edge of pronotum rounded and with a shallow notch, male antennae same length as hind femora, male cerci black and only slightly narrowed at the middle . . . . . ***Booneacris glacialis canadensis***
- 2b. Anterior edge of pronotum truncate, male antennae longer than length of hind femora, male cerci brown and strongly narrowed at the middle . . . . . ***(Booneacris variegata)***
  
- 3a. Green body with pink colorations and usually a salmon-colored ring above hind knee, tegmina typically do not reach end of abdomen . . . 4
- 3b. Not as above . . . . . 5
  
- 4a. Surface of prozona smooth, pronotum with a yellow central stripe and only slightly tectiform, tegmina may extend beyond abdomen . . . . . ***Hesperotettix viridis pratensis***
- 4b. Surface of prozona rough, pronotum distinctly tectiform with medium carina purplish, tegmina shorter than abdomen . . . . . ***Hesperotettix speciosus***
  
- 5a. SHORT-WINGED, tegmina do not reach end of abdomen (some long-winged females during oviposition appear to have wings shorter than abdomen because abdomen is extended) . . . . 6
- 5b. LONG-WINGED, tegmina reach end of abdomen or beyond . . . . . 22
  
- 6a. Bright green legs, pronotum twice as long as dorsal pronotal width with parallel sides, tegmina linear and two-thirds abdominal length, hind femora unbanded . . . . . ***(Paroxya hooseri)***
- 6b. Legs, if green, not so bright, pronotum shorter, tegmina, if linear, much shorter, hind femora banded or unbanded . . . . . 7
  
- 7a. SHORT TEGMINA, UP TO 1-1/2 TIMES PRONOTAL LENGTH . . . . . 8
- 7b. LONGER, STRONGLY OVERLAPPING TEGMINA 1 1/2 TIMES PRONOTAL LENGTH TO NEAR APEX OF ABDOMEN . . . 20
  
- 8a. Head large, nearly 1 1/2 times length of pronotum, anterior edge of pronotum flared for the large head, edges of tegmina rolled inward . . . . . ***Phoetaliotes nebrascensis***
- 8b. Head not large, edges of tegmina not rolled inward . . . . . 9
  
- 9a. Body and tegmina unicolorous green, associated with wormwoods (*Artemisia* sp.) or perennial ragweed (*Ambrosia psilostachya*) . . . . 10
- 9b. Body brown, yellow or dark green, abdomen brown or yellow . . . . 11

- 10a. Pale sage-colored body, abdomen pinkish, tegmina apices narrowed to blunt points . . . . . ***(Hypochlora alba)***
- 10b. Grass-green body conspicuously covered with short pale hairs . . . . . ***(Campylacantha olivacea)***
  
- 11a. HIND TIBIAE GREEN OR BLUE, male genitalia as in Appendix B, Table A . . . . . 12
- 11b. HIND TIBIAE RED/ PINK, male genitalia as in Appendix B, Table B . . 15
  
- 12a. Tegmina narrowly oblong and well separated, hind femora unbanded . . . . . ***(Melanoplus gracilis)***
- 12b. Tegmina round or oval, hind femora banded or not . . . . . 13
  
- 13a. Hind femora red on lower edge, head large, male cerci twisted, yellow basal ring on hind tibiae, oak forest species . . . . . ***Dendrotettix quercus***
- 13b. Hind femora may be yellow-orange but not red on lower edge, male cerci straight, hind tibiae basal ring creamy but not yellow . . . 14
  
- 14a. Black and white basal rings on hind tibiae, hind femora strongly banded, though less so on female, female body length usually less than 24 mm . . . . . ***Melanoplus viridipes***
- 14b. Black basal ring lacking on hind tibiae, femoral bands indistinct, female at least 24 mm in length, adults appear after August . . . . . ***Melanoplus rusticus obovatipennis***
  
- 15a. Tegmina broadly rounded, dorsal abdomen with wide light stripe . . . . ***Melanoplus islandicus***
- 15b. Tegmina apices narrowed to blunt points, abdominal stripe thin or lacking . . . . . 16
  
- 16a. TEGMINA WITH DORSAL AND LATERAL SURFACES SHARPLY DEFINED, usually with dorsal areas lighter . . . . . 17
- 16b. TEGMINA WITHOUT WELL DEFINED DORSAL AREAS . . . . . 19
  
- 17a. Dorsum of pronotum distinctly carinate laterally and marked with pale stripes that extend from behind eyes to tips of tegmina, males lack furculae, female ovipositor valve apices notched . . . . . ***Paratytopia brunneri***
- 17b. Dorsum of pronotum rounded onto lateral lobes and lacking pale stripes, males with furculae, female ovipositor valves unnotched . . 18
  
- 18a. Dorsal areas of tegmina light brown with a few speckles, hind femora pale or reddish-yellow below, female body length 23-29 mm with a distinct 90 degree notch on 8<sup>th</sup> abdominal sternum (Figure 20) . . . . . ***Melanoplus walshii***
- 18b. Tegmina dark brown with a row of dark quadrate spots, head and pronotum speckled, hind femora deep red below, female body length at least 28 mm with an obtuse notch on 8<sup>th</sup> abdominal sternum (Figure 19) . . . . . ***(Melanoplus huroni)***

(Key B continued on next page)

## KEY B. (Continued)

- 19a. Prozona longer than broad, anterior edge of pronotum truncate to faintly notched, abdomen not distinctly banded . . . . . **Melanoplus scudderi scudderi**
- 19b. Prozona broader than long or quadrate, abdominal segments banded with anterior portion black and posterior portion yellow . . . . . **Melanoplus dawsoni**
- 20a. Large species with convergent light stripes on tegmina, femora with dark longitudinal stripe on upper half of the outer face, male cercus with a protrusion (Appendix B, Table E) . . . . . **Melanoplus bivittatus**
- 20b. Smaller species (females shorter than 25 mm) lacking stripes on tegmina, hind femora banded, male cercus lacking a protrusion (Appendix B, Table C) . . . . . 21
- 21a. Distinct bands on outer faces of femora, tibiae paler near base, prosternal tubercle short and stout, in northern habitats under conifers in association with heaths-blueberries or huckleberries . . . . . **Melanoplus fasciatus**
- 21b. Unbanded outer femora, prosternal tubercle moderately long, in lush grasses or wetland habitats . . **Melanoplus borealis borealis**
- 22a. MESOSTERNUM LATERAL LOBES LONGER THAN WIDE with straight inner margins (Figure 14), large-bodied grasshoppers . . . . . **Cyrtacanthacridinae, Bird Locusts, 23**
- 22b. LATERAL LOBES AS WIDE AS LONG with curved inner margins (Figure 15) . . . . . 26

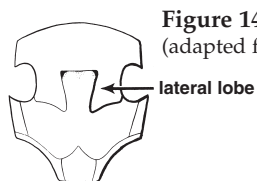
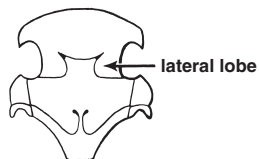


Figure 14. Cyrtacanthacridinae mesosternum (adapted from Capinera and Sechrist 1982).

Figure 15. Melanoplineae mesosternum (adapted from Capinera and Sechrist 1982).



- 23a. Tegmina marked with very large dark brown spots extend well beyond abdomen, large species (males to 52 mm, females to 68 mm) . . **Schistocerca americana**
- 23b. Tegmina slightly beyond abdomen marked with little or no mottling, body smaller . . . . . 24
- 24a. Rusty-brown body with narrow brown mid-dorsal stripe on head, pronotum tectate, small *Schistocerca* (males 25-29 mm, females 37-46 mm, usually less than 42 mm) . . **Schistocerca damnifica**
- 24b. Body usually light brown with or without a pale mid-dorsal stripe, body larger . . . . . 25

- 25a. With or without pale mid-dorsal stripe, male fore and middle femora inflated, throughout the state particularly in dry habitats . . . . . **Schistocerca lineata**
- 25b. Always with a pale mid-dorsal stripe on head, pronotum and usually to wingtips, males without inflated fore and middle femora, moist habitats, wetlands, or thickets of mesic forest in southeastern Wisconsin . . **Schistocerca alutacea**

**Note:** The following portion of the key covering the long-winged *Melanoplus* spp. includes the uncommon macropterous forms of the typically short-winged species *M. dawsoni*, *M. borealis borealis*, and *M. fasciatus*.

- 26a. MALES (see Appendix B, Tables D, E and F) . . . . . 27
- 26b. FEMALES (see Appendix B, Table G) . . . . . 43
- 27a. LONG FURCULAE covering more than one-third length of supra-anal plate (see Appendix B, Table D) . . . . . 28
- 27b. SHORT FURCULAE from one-third length of supra-anal plate to mere nubs (see Appendix B, Tables E and F) . . . . . 33
- 28a. Notched subgenital plate (feebly emarginate in *Melanoplus dawsoni*) . . . . . 29
- 28b. Subgenital plate unnotched . . . . . 31
- 29a. MESOSTERNUM WITH BLUNT TUBERCLE OR SWELLING (less conspicuous on females), cerci slightly narrowed at the middle and about twice as long as wide . . . . . 30
- 29b. NO TUBERCLE ON MESOSTERNUM, cerci narrowed at the middle and more than twice as long as wide with apex spatulate, abdomen bright yellow with black bands on anterior portions of segments (see Appendix B, Table B) . . . **Melanoplus dawsoni**
- 30a. Hind femora entirely yellowish below, furculae heavy and pointed downward, found mostly in forested or shrubby areas . . . . . **Melanoplus bruneri**
- 30b. Hind femora with red/pink on outer and lower flanges, furculae pointed outward, most commonly found in open areas . . . . . **Melanoplus sanguinipes sanguinipes**
- 31a. Tibiae blue with white spines tipped in black, furculae truncate . . . . . **Melanoplus flavidus**
- 31b. Tibiae red to yellowish, furculae not truncate . . . . . 32
- 32a. Subgenital plate expanded, cerci apices truncate . . . . . **Melanoplus femurrubrum**
- 32b. Subgenital plate not expanded, cerci apices rounded (see Appendix B, Table C) . . . . . **Melanoplus borealis borealis**
- 33a. CERCUS WITH A VENTRAL PROTRUSION (see Appendix B, Table E) . . . . . 34
- 33b. CERCUS WITHOUT A PROTRUSION (see Appendix B, Table F) . . 38

(Key B continued on next page)

## KEY B. (Continued)

- 34a. Cercus ventral protrusion is a distinct thumb . . . . . **Melanoplus keeleri luridus**
- 34b. Cercus ventral protrusion is only a knob or corner . . . . . 35
- 35a. Small to medium species, about 18-19 mm, with bent cerci . . . . . **Melanoplus confusus**
- 35b. Large species with large, longer than 19 mm, roughly boot-shaped cerci . . . . . 36
- 36a. Distinct round fuscous spots on tegmina, cercus "boot sole" flat . . . . . **Melanoplus punctulatus griseus**
- 36b. No spots on tegmina, "boot sole" arched . . . . . 37
- 37a. Hind femora marked with a herringbone pattern . . . **Melanoplus differentialis differentialis**
- 37b. Hind femora with dark longitudinal stripe on upper portion of its outer face . . . . . **Melanoplus bivittatus**
- 38a. APEX OF CERCUS UNSYMMETRICAL, extending further ventrally . . 39
- 38b. CERCUS hourglass shaped, widening to a SYMMETRICAL APEX . . 40
- 39a. Hind femora yellow below and inside with lower flange obsolete basally, dorsal portion of tegmina with spots, present after mid-August in dry grassy areas, never in forests . . . . . **Melanoplus gladstoni**
- 39b. Hind femora red to orange below with lower flange complete, found June to September in northern habitats under conifers in association with heaths (see Appendix B, Table C) . . . . . **Melanoplus fasciatus**
- 40a. Furculae nearly one-third length of supra-anal plate, apex of subgenital plate subtruncate with a wide saddle-like notch . . . . . **Melanoplus angustipennis**
- 40b. Furculae much shorter, subgenital plate broadly rounded . . . . . 41
- 41a. Hind femora banded only on dorsal and inner surface, hind tibiae may be red or blue without dark basal ring, forewings immaculate or with a few faint spots near base . . . . . 42
- 41b. Hind femora with distinct broad black bands, tibiae dark red possibly with darker basal ring, median areas of tegmina with row of subquadrate dull yellow spots, coloration dark fuscous brown above, dull yellow-reddish below, found in sandy areas in northern pine forests and pine barrens . . . . . **Melanoplus stonei**

- 42a. The species in this couplet can clearly be separated only by examination of internal genitalia. LIGHT COLORATION, yellowish brown to reddish, usually with two pale stripes on pronotum and dark stripe on top of head extending to posterior pronotum, hind tibiae usually blue, male usually longer than 24 mm, female usually longer than 26 mm, found in sandy, gravelly grasslands . . . . . MIGHT BE (**Melanoplus packardii packardii**)
- 42b. DARK COLORATION, greenish brown to greenish gray, may or may not have pale stripes, hind tibiae may be blue, red, or pink, male usually shorter than 24 mm, female usually shorter than 26 mm, found in sandy habitat along lakes and waterways . . . . . **Melanoplus foedus fluviatilis**
- 43a. MESOSTERNUM WITH SWELLING OR BLUNT TUBERCLE . . . . . 44
- 43b. MESOSTERNUM FLAT . . . . . 45
- 44a. Dorsal angle of dorsal ovipositor valve slightly more than 90 degrees (Figure 16), hind femora with red or pink on outer and lower flanges, long tegmina . . . . . **Melanoplus sanguinipes sanguinipes**
- 44b. Dorsal ovipositor valve broadly curved (Figure 17), hind femora yellowish below, tegmina extend to hind knees . . . . . **Melanoplus bruneri**

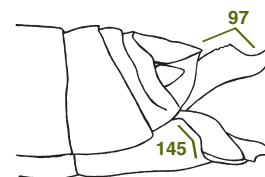


Figure 16. *Melanoplus sanguinipes*, female genitalia (adapted from Vickery and Kevan 1985).

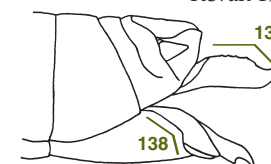


Figure 17. *Melanoplus bruneri*, female genitalia (adapted from Vickery and Kevan 1985).

- 45a. Significant acute notch on 8<sup>th</sup> abdominal sternum resulting in an extended lobe (Figure 18) . . . . . 46
- 45b. Notch angle 90 degrees or more . . . . . 47



Figure 18. Abdominal sternum with extended lobe (adapted from Vickery and Kevan 1985).

- 46a. Large body over 30 mm, yellow hind femora with herringbone pattern, cercus narrowed to a point . . . **Melanoplus differentialis differentialis**
- 46b. Smaller species, dark hind femora banded and lacking herringbone pattern, cercus blunt, ventral ovipositor valve untoothed or barely toothed, prominent eyes, coniferous or possibly oak habitat . . . . . **Melanoplus punctulatus griseus**

(Key B continued on next page)

## KEY B. (Continued)

- 47a. Dorsal angle of dorsal ovipositor valve  
NEAR 90 DEGREES (Figure 19) . . . . . 48
- 47b. Angle of dorsal ovipositor valve  
WELL OVER 90 DEGREES (Appendix B, Table G). . . . . 51
- 48a. Notch on 8<sup>th</sup> abdominal sternum 100 degrees or more (Figure 19) . . . 49
- 48b. Notch on 8<sup>th</sup> abdominal segment with angle about 90 degrees  
(Figure 20) . . . . . 41

Figure 19. Abdominal sternum with obtuse notch (adapted from Vickery and Kevan 1985).

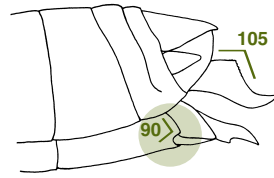
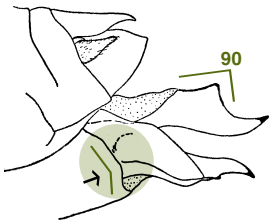


Figure 20. Abdominal sternum with right angled notch (adapted from Vickery and Kevan 1985).

- 49a. Body length less than 25 mm, tibiae blue or not . . . . . 50
- 49b. Body length at least 25 mm,  
tibiae blue or purple . . . . . **Melanoplus flavidus**
- 50a. Cercus stubby and convex on both sides (Figure 21),  
prosternal tubercle large and thick, a shiny black  
patch behind eye uninterrupted by pale markings  
and extending onto prozona . . . . . **Melanoplus confusus**
- 50b. Cercus elongate (Figure 22), prosternal tubercle  
narrow, black marking behind eye interrupted  
by pale markings . . . . . **Melanoplus angustipennis**

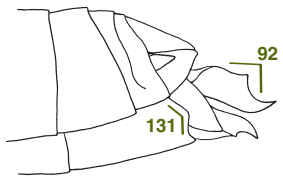
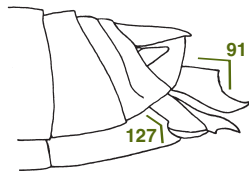


Figure 21. *Melanoplus confusus*, female genitalia (adapted from Vickery and Kevan 1985).

Figure 22. *Melanoplus angustipennis*, female genitalia (adapted from Vickery and Kevan 1985).



- 51a. Abdomen bright yellow with  
black bands on anterior of segments . . . . . **Melanoplus dawsoni**
- 51b. Not as above . . . . . 52

**Note:** The following species are best separated by identification of associated males. Appendix B, Table G provides an additional aid to separate females of these species.

- 52a. Hind femora without bands . . . . . 53
- 52b. Hind femora with conspicuous bands . . . . . 54
- 53a. Hind femora with a dark longitudinal stripe on upper  
portion, lower surface of femora yellow, tegmina  
usually extend beyond hind knees . . . . . **Melanoplus femurrubrum**
- 53b. Hind femora marked with dark patches on dorsal and inner surface  
only and lower surface light orange to red, tegmina usually  
do not extend to hind knees . . . . . **Melanoplus borealis borealis**
- 54a. Hind femora distinctly banded with black markings  
merging into a line pointed toward the base and  
lower surface yellow-orange . . . . . **Melanoplus keeleri luridus**
- 54b. Hind femora red-orange below or, if yellow below,  
with marks only on upper and inner surfaces . . . . . 39



BART DREES

## KEY C. The Bandwinged Grasshoppers (Oedipodinae)



GIF BEATON

- 1a. MEDIAN PRONOTAL CARINA CUT BY ONE SULCUS . . . . . 2
- 1b. MEDIAN PRONOTAL CARINA CUT BY TWO OR MORE SULCI . . . . . 19
  
- 2a. BASE OF HIND WINGS CLEAR,  
SMOKEY, OR WITH A YELLOW TINT . . . . . 3
- 2b. BASE OF HIND WINGS STRONGLY COLORED  
(yellow/orange/red) OR BLACK. . . . . 6
  
- 3a. Front portion of lateral pronotal lobes glossy black,  
tegmina with dark spots and converging light stripes,  
hind wings clear . . . . . ***Camnula pellucida***
- 3b. Lateral lobes of pronotum not so marked,  
tegmina clear, speckled, or banded. . . . . 4
  
- 4a. Adults present in spring to early summer, tegmina  
and hind femora lacking bands, females usually green  
and males brown in Wisconsin . . . . . ***Chortophaga viridifasciata***
- 4b. Adults in late summer to fall, tegmina  
and hind femora with 2-3 dark cross bands . . . . . 5
  
- 5a. Hind tibiae brown-black, vertex wider than long,  
metazona with black dashes perpendicular to  
posterior edge, abdomen wood brown . . . . . ***Encoptolophus sordidus***
- 5b. Hind tibiae blue-gray, vertex longer than wide, metazona with black  
marks but not dashes, abdomen yellow. . . . . ***Encoptolophus costalis***
  
- 6a. Disc of hind wings black with pale margins . . . . . ***Dissosteira carolina***
- 6b. Disc of hind wings yellow, orange,  
or red and bordered by a black band . . . . . 7
  
- 7a. HIND TIBIAE RED, ORANGE, OR YELLOW . . . . . 8
- 7b. HIND TIBIAE LACKING RED, ORANGE, OR YELLOW . . . . . 15
  
- 8a. Hind tibiae with black bands in basal third . . . . . 9
- 8b. Hind tibiae without black bands . . . . . 10
  
- 9a. Median pronotal carina as high as top of head  
in profile, body brown, tegmina with wide bands,  
wide black bands on hind tibiae, dry deciduous  
woods and wood margins . . . . . ***Spharagemon bolli***
- 9b. Median pronotal carina low, body and tegmina heavily mottled,  
black bands on hind tibiae narrow, sandy soil, pine woods,  
pine/oak barrens . . . . . ***Spharagemon marmorata marmorata***
  
- 10a. MOTTLED BODY, tegmina speckled with tiny spots,  
black band across center third of hind wing, pronotum smooth. . . . . 11
- 10b. UNMOTTLED head, thorax, and hind femora, tegmina with large  
blotches, black hind wing band marginal, pronotum tuberculate . . . . . 12

- 11a. Median pronotal carina as high as top of head in profile and deeply  
cut, posterior margin of pronotum forming a distinctly acute angle,  
on sand dunes, beaches, sand blows . . . . . ***Spharagemon collare***
- 11b. Median pronotal carina low and shallowly cut,  
posterior pronotal angle obtuse or near 90 degrees  
some females of . . . . . ***Spharagemon marmorata marmorata***
  
- 12a. Adults from spring to early July,  
METAZONA LONGER THAN PROZONA . . . . . 13
- 12b. Adults from late July to fall,  
PROZONA AND METAZONA SUBEQUAL . . . . . ***Hippiscus ocelote***
  
- 13a. Inner faces of hind femora yellow-orange with black bands . . . . . 14
- 13b. Inner faces of hind femora yellow-orange with  
no black bands . . . . . ***Pardalophora haldemani***
  
- 14a. Inner faces of hind femora yellow-orange, tegmina  
evenly dark between Cu1 and Cu2 veins (see Figure 23),  
hind wings red, adults from May through June in dry,  
open, sparsely vegetated habitat . . . . . ***Pardalophora apiculata***
- 14b. Inner faces of hind femora blue, tegmina spotted between  
Cu1 and Cu2 veins, dorsal areas of tegmina may have pale  
converging lines, hind wings orange to red, adults present after  
June in sedges and tall grasses of ravines, slopes, woods  
openings, a southern species . . . . . ***Pardalophora phoenicoptera***

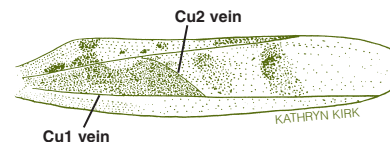


Figure 23. Cubitus wing veins  
of *Pardalophora apiculata*.

- 15a. ADULTS FROM SPRING TO MID-SUMMER . . . . . 16
- 15b. ADULTS FROM MID-SUMMER TO FALL . . . . . 18
  
- 16a. Fastigium as broad as long, foveolae square, hind tibiae  
light brown to black with black band . . . . . ***Arphia sulphurea***
- 16b. Fastigium longer than broad, foveolae not square, inner  
face of hind tibiae may be bluish and may or may not be banded . . . . . 17
  
- 17a. Foveolae triangular, male body length less than 25 mm.,  
hind tibiae unbanded and yellowish with perhaps a  
bluish cast, hind wings red to yellow . . . . . ***Arphia conspersa***
- 17b. Foveolae rectangular and longer than tall, male body  
length greater than 28 mm, hind tibiae usually greenish-blue  
with a black band, hind wings yellow. . . . . ***Arphia simplex***

(Key C continued on next page)

- 18a. Spur of black band on hind wing extending toward the base of the wing only into first half of the colored disc (see Figure 9), hind wings yellow, median pronotal carina as high as top of head in profile . . . . . ***Arphia xanthoptera***
- 18b. Spur of black band on hind wing extending into the upper half of the colored disc, hind wings pink to red or yellow, median pronotal carina low . . . . . ***Arphia pseudonietana***
- 19a. ANTENNAE ENSIFORM (see Figure 10), tibiae greenish, open sand habitat . . . . . ***Psinidia fenestralis***
- 19b. ANTENNAE FILIFORM (see Figure 10), tibiae may be pale blue but not greenish . . . . . 20
- 20a. Hind tibiae red, adults from May to early July . . . . . 21
- 20b. Hind tibiae not red, adults from July to September . . . . . 22
- 21a. Inner faces of hind femora red, median pronotal carina may be indistinct on prozona, dry prairies, gravelly to rocky soils . . . . . **(*Xanthippus corallipes*)**
- 21b. Inner faces of hind femora usually yellow-orange, median pronotal carina distinct on prozona . . . ***Paradalophora haldemani***
- 22a. HIND TIBIAE BLUE TO BLUE-GRAY . . . . . 23
- 22b. HIND TIBIAE BROWN TO DULL YELLOW . . . . . 24
- 23a. MALE CERCUS POINTED, distinct white spot on lateral pronotal lobe, hind wings clear or pale yellow, bare rocky or gravelly ground, quarries, roadsides . . . . ***Trachyrhachys kiowa***
- 23b. MALE CERCUS SPOON-SHAPED, lateral pronotal lobe unspotted, hind wings yellow or orange, western short-grass prairie species . . . . . **(*Metator pardalinus*)**
- 24a. Body and tegmina sooty dark gray to blackish, on rocky habitat of riverways, lakeshores, lichen-encrusted rock, gravel pits . . . . . ***Trimerotropis verruculata verruculata***
- 24b. Body and tegmina usually pale, yellow, gray-brown, burnt orange or reddish with white markings, in sandy habitat . . . . . 25
- 25a. Inner faces of hind femora pale basally, southern and western Wisconsin on sandy shores of lakes and rivers . . . . . ***Trimerotropis maritima***
- 25b. Inner faces of hind femora with black in the basal area, northern Great Lakes dunes . . . . . ***Trimerotropis huroniana***

